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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/471,520	12/23/1999	KONSTANTINOS I. PAPATHOMAS	EN995064BV	7516

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EXAMINER

BERMAN, SUSAN W

ART UNIT	PAPER NUMBER
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1711

DATE MAILED: 02/21/2003

22

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/471,520

Applicant(s)

PAPATHOMAS ET AL.

Examiner

Susan W Berman

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 December 2002.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,6-8 and 13-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,6-8 and 13-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 December 1999 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)                      4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)                      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_                      6) ☐ Other: \_\_\_\_\_

*Response to Amendment*

See the new rejections under 35 USC 112 set forth below. The rejections over prior art are maintained for the reasons set forth in the response to arguments. It is noted that claims 19-20 were added in Amendment D and were discussed in the rejections including the disclosure of Christie et al but the claims numbers were inadvertently not included in the rejections set forth in paper number 20.

*Response to Arguments*

Applicant's arguments filed 12-24-2002 have been fully considered but they are not persuasive. Applicant argues that the prior art does not teach compositions "consisting essentially of" a cyanate ester resin. It is agreed that Ayano et al and Gaku et al teach compositions comprising ethylenically unsaturated monomers in addition to cyanate ester resins. However, the comprising language in the instant claim language sets forth a composition "comprising" a cyanate ester resin, a filler, a photoinitiator and additional unrecited components. The comprising language defining the composition encompasses compositions comprising ethylenically unsaturated monomers in combination with cyanate esters. The "consisting essentially of" language in the instant claims limits the cyanate ester resin to those set forth; it does not exclude other components of the composition.

Applicant argues that the prior art does not teach compositions "for reinforcing a bond". This argument is not persuasive for the following reasons. The instant claims are drawn to a composition and the phrase "for reinforcing a bond" merely sets forth a future intended use for the composition. Since the prior art compositions comprise the same components as set forth in the instant claims the prior art compositions would also be expected to be useful for reinforcing a bond, in the absence of evidence to the contrary. Furthermore, Ayano et al specifically teach that the disclosed compositions are useful for adhesive assembly and that reinforcing materials can be included in the compositions (column 10, lines 41-66). With respect to claim 7, the cited prior art teaches a process comprising providing the composition set forth in the claim. The recitation of the future intended use "for reinforcing a bond" is not

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considered to be sufficient to distinguish the instantly claimed process from the method of providing a compositions taught in the prior art in the absence of a process step that differs from the prior art process.

### ***Drawings***

The drawings are objected to because the drawing sheets are not an acceptable size. See 37 CFR 1.84(f). Corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 6, 14-17 and 19-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. There is no antecedent basis in claim 1 for the recitation “photoinduced polymerizable cyanate ester composition” recited in claims 6 and 14-17. Claim 1 recites a “composition for reinforcing a bond”. Applicant could amend claim 1 to recite “photoinduced polymerizable cyanate ester composition for reinforcing a bond” or delete “photoinduced polymerizable cyanate ester” from the dependent claims. There is no antecedent basis in claim 1 for the recitation in claim 15 of a surface treating agent. It is suggested that claim 15 should be dependent from claim 14 or set forth composition of claim 1 further comprising a surface treating agent wherein the amount of surface treating agent ... There is no antecedent basis in claim 7, which recites “a process for reinforcing a bond” for the recitation in claim 20 “process for providing a photoinduced polymerizable cyanate ester composition”.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 6-8, 13, 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ayano et al (4,383,903) in view of McCormick et al (5,215,860). See Ayano et al: the Abstract, columns 3-7, column 9, lines 28-50, and column 10, lines 20-23, and lines 44-47. Ayano et al teach adding liquid or elastic rubbers having one or more (meth)acryloyl groups that would be expected to act as toughening agents (column 7, lines 1-9). The disclosed photoinitiators do not include organometallic complex salts as set forth in the instant claims. Ayano et al disclose organo metal salts as heat curing catalysts. Ayano et al teach that the disclosed compositions can contain fillers but do not mention surface treating agents (column 10, lines 41-47).

McCormick et al, in analogous art, teach that an organometallic compound curing agent can be used in an "energy-curable" cyanate composition. McCormick et al teach that organometallic compounds provide curing, including radiation curing, at lower temperatures or faster rates than previous catalysts, allow easier coating, provide temperature control and can be used to provide 100% reactive compositions (column 2, line 61, to column 3, line 20).

It would have been obvious to one skilled in the art at the time of the invention to employ organometallic catalysts and radiation curing, as taught by McCormick et al, with the compositions disclosed by Ayano et al. Ayano et al provide motivation by teaching that photoinitiators and radiation curing can be used. McCormick et al teach the advantages of the organometallic salt photoinitiators for curing cyanate ester compositions. With respect to claims 8 and 13, the polymerization product instantly claimed would not be expected to be significantly different from the product that is obtained by polymerizing the compositions disclosed by Ayano et al. There is no evidence of record that the use of an

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organometallic photoinitiators or of a surface treating agent in the instantly claimed composition results in a different polymerized product.

Claims 1, 6-8, 13, 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gaku et al (4,533,727) in view of McCormick et al (5,215,860) and Shimp (4,709,008). Gaku et al disclose cyanate ester compositions comprising photocrosslinking monomers, thermosetting monomers and/or thermoplastic resins (columns 5-7). Gaku et al teach blending compounds "B" with curable resin "A". Compounds B include compounds (B)(iv), which are thermosetting monomers or prepolymers, and compounds (B)(v), which include rubbers, polysulfone, polyimides, polyesters and other resins. Fillers, such as silica, and reinforcing agents may be added; however, Gaku et al do not mention particle size (column 8). Photoinitiators, including diphenyl iodonium, and heat curing catalysts are taught in columns 5-6 but do not include organometallic photoinitiators.

McCormick et al, in analogous art, teach that an organometallic compound curing agent can be used in an "energy-curable" cyanate composition. McCormick et al teach that organometallic compounds provide curing, including radiation curing, at lower temperatures or faster rates than previous catalysts, allow easier coating, provide temperature control and can be used to provide 100% reactive compositions (column 2, line 61, to column 3, line 20). Shimp discloses cyanate ester compositions that can be cured by heat and comprise catalysts such as zinc octanoate, etc. (column 3, lines 42-64). Additives taught include thermoplastic resin tougheners, reinforcing fibers, colloidal silica, mineral fillers and pigments (column 4, lines 27-32). Shimp does not mention particles size of fillers.

It would have been obvious to one skilled in the art at the time of the invention to employ organometallic catalysts and radiation curing, as taught by McCormick et al, with the compositions disclosed by Gaku et al. Gaku et al provide motivation by teaching that photoinitiators and radiation curing can be used. McCormick et al teach the advantages of the organometallic salt photoinitiators for

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curing cyanate ester compositions. With respect to claims 16 and 17, It would have been obvious to one skilled in the art at the time of the invention to include thermosetting prepolymers disclosed as (B)(iv) and/or rubbers or resins disclosed as (B)(v) in the compositions taught by Gaku et al since Gaku et al teach blending these compounds with curable resin A. One skilled in the art at the time of the invention would have been motivated by an expectation of providing toughening to the curable resin since thermoplastics, thermosetting and rubber materials such as those disclosed by Gaku et al are well known in the art for providing toughening to curable compositions. Shimp provides additional motivation by teaching that thermoplastic resin tougheners can be added to analogous compositions of cyanate esters.

Claims 13-15 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ayano et al in view of McCormick et al (5,215,860), as applied to claims 1, 7 and 8 above, and further in view of Christie et al (5,250,848) or Swei (5,182,173). Ayano et al teach that the disclosed compositions but do not mention surface treating agents or silane compounds corresponding to those set forth in claims 13, 14 and 18 (column 10, lines 41-47). Christie et al teach analogous compositions comprising epoxides and/or curable cyanate esters, reactive modifier and a filler that is optionally treated with a coupling agent. Christie et al teach preferably including an inorganic filler, preferably high purity or fused amorphous silica having a particle size not greater than 31 microns, preferably 0.7 to 31 microns. See column 5, lines 3-28. Swei disclose a composite filler material that is a filler material, such as silica, coated with a layer of silicone elastomer. The fillers are suitable for use in matrix materials such as cyanate esters. The silicone elastomer is the reaction product of a multifunctionally terminated polysiloxane and a silane crosslinking agent. See column 1, lines 30-49, column 2, lines 12-32 and column 5, lines 39-50.

It would have been obvious to one skilled in the art to employ a filler such as the optionally surface treated filler in analogous compositions taught by Christie et al as the filler in the compositions taught by Ayano et al. Ayano et al provide motivation by teaching addition of filler. Christie et al teach

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that the preferred filler can be treated with a coupling agent, thus providing a filler and a surface treating agent, as required in the instantly claimed compositions. Christie et al also provide motivation to employ a filler having a particle size less than 31 microns and substantially free of alpha particle emissions so that the compositions will readily flow into gaps between a chip and substrate carrier and to avoid generation of electron/hole pairs.

Alternatively, It would have been obvious to one skilled in the art to employ the composite filler material taught by Swei as the filler in the compositions taught by combination of Ayano et al and McCormick et al. One of ordinary skill in the art at the time of the invention would have been motivated by a reasonable expectation of producing a highly filled polymeric matrix material having improved ductility and toughness, as taught by Swei.

Claims 13-15 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gaku et al (4,533,727) in view of McCormick et al (5,215,860) and Shimp (4,709,008), as applied to claims 1, 7 and 8 above, and further in view of Christie et al (5,250,848) or Swei (5,182,173). Gaku et al do not mention adding surface treating agents or silane compounds corresponding to those set forth in claims 13, 14 and 18, however, Gaku et al teach coupling agents as additives (column 8, lines 23-49). Christie et al teach analogous compositions comprising epoxides and/or curable cyanate esters, reactive modifier and a filler that is optionally treated with a coupling agent. See column 5, lines 3-28. Swei disclose a composite filler material that is a filler material, such as silica, coated with a layer of silicone elastomer. The fillers are suitable for use in matrix materials such as cyanate esters. The silicone elastomer is the reaction product of a multifunctionally terminated polysiloxane and a silane crosslinking agent. See column 1, lines 30-49, column 2, lines 12-32 and column 5, lines 39-50.

Gaku et al do not mention adding surface treating agents or silane compounds corresponding to those set forth in claims 13, 14 and 18, however, Gaku et al teach coupling agents as additives (column 8,



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lines 23-49). Christie et al teach analogous compositions comprising epoxides and/or curable cyanate esters, reactive modifier and a filler that is optionally treated with a coupling agent. See column 5, lines 3-28. It would have been obvious to one skilled in the art to employ a filler such as the optionally surface treated filler in analogous compositions taught by Christie et al as the filler in the compositions taught by Gaku et al, thus providing both instantly claimed filler and surface treating agent. Gaku et al provide motivation by teaching addition of filler and coupling agents. Christie et al provide motivation to employ a filler having a particle size less than 31 microns and substantially free of alpha particle emissions so that the compositions will readily flow into gaps between a chip and substrate carrier and to avoid generation of electron/hole pairs. Christie et al also provide motivation to employ a filler treated with a coupling agent by teaching that the treated filler is preferred.

Alternatively, It would have been obvious to one skilled in the art to employ the composite filler material taught by Swei as the filler in each of the prior art compositions. One of ordinary skill in the art at the time of the invention would have been motivated by a reasonable expectation of producing a highly filled polymeric matrix material having improved ductility and toughness, as taught by Swei.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Susan W Berman whose telephone number is 703 308 0040. The examiner can normally be reached on M-F 9:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Seidleck can be reached on 703 308 2462. The fax phone numbers for the organization where this application or proceeding is assigned are 703 872 9310 for regular communications and 703 872 9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308 0661.



Susan W Berman  
Primary Examiner  
Art Unit 1711

SB  
February 15, 2003